

1 Puzzles

Puzzle 1 The `define` keyword tells C to substitute the expression $VOL(X, Y, Z)$ for $X * Y * Z$. Hence, $VOL(1 + 1, 2 + 2, 3 + 3)$ yields $1 + 1 * 2 + 2 * 3 + 3 = 1 + 2 + 6 + 3 = 12$, because C follows the standard order of operations. The `define` keyword is part of the pre-processor, so the substitution occurs before evaluation of the individual expressions X, Y, and Z, giving us the incorrect result. To fix this, we can place parentheses around X, Y, and Z in the expression so that $VOL(X, Y, Z)$ is given by $(X) * (Y) * (Z)$ to arrive at the correct result of 48, because this enforces that each parameter must be evaluated before they are combined.

Puzzle 2 As defined, the `swap` function attempts to swap x and y, which are memory addresses of two values. While this would work in theory, since C is call-by-value, the function swaps two local variables containing the addresses, not the actual addresses, thereby undermining the entire point of passing pointers to the function. A quick solution, then, is to swap the values at the addresses by de-referencing the pointers passed to the function.

Puzzle 3 Since the value pointed to by p is not initialized, adding 1 to whatever data is in the bit of allocated memory yields undefined behavior. To remedy this issue, we just initialize *p with an integer value. Also, there is no check to see if `malloc` fails, so we can add checks for null pointers in the `add1` and `puzzle3` functions, just to be safe.

Puzzle 4 There are no errors in this implementation, but I added additional parentheses to get rid of a compiler warning.

Puzzle 5 Aside from the easily fixable unused parameter of a in the `test safe division` function, which gives a compiler warning, there are no errors in this implementation.

Puzzle 6 There are two errors present in the `set vector` function. First, the for loop iterates $n + 1$ times, so we'll end up modifying memory that isn't part of the allocated array. To fix this, we change the condition to $i < n$. Furthermore, the function uses `value`, an undeclared variable, to fill the array. Instead, it should use `v`.

2 Tasks

Task 5.1 Since only one late day remained, this lab is considered two days late, so 20 percent, or **15 points**, will be deduced from the lab grade.

Task 5.2 Regrade requests must be sent within **5 working days** of when the grade was received, and you should speak with **the grader, Jillian Ritchey**, about regrade requests.

Task 5.3 The students have **broken the collaboration policy**. Unless specific permission is granted, collaboration is forbidden on the individual portion of the assignment. This collaboration was also not documented on the assignment.